

BEES OF THE NEVADA TEST SITE¹

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During the years from 1959 to 1965, many bees were collected at the Nevada Test Site as part of the ecological studies conducted by the Department of Zoology and Entomology of Brigham Young University, under contract with the U. S. Atomic Energy Commission. Most of these were recently identified by Dr. G. E. Bohart, Entomology Research Division, Department of Agriculture, Logan, Utah, and Mr. P. H. Timberlake, Riverside, California. The identifications form the basis of this report on the host relationships, seasonal occurrence, and geographic distribution at the test site.

Further studies specifically directed toward the bees, particularly during the blooming periods of the desert plants, undoubtedly would yield additional records. Genera and species are listed alphabetically for convenience. Areas of collection refer to divisions delineated by Allred, Beck, and Jorgensen (1963a and b). Methods of collection used were hand capture, aerial and sweep nets, and can pit-traps (Allred *et al.*, 1963a).

SPECIES AND PLANT ASSOCIATIONS

- Agapostemon cockerelli*: 2 ♀ ♀; areas 17, 18; *Malacothrix glabrata*; June, July.
- A. texana*: 2 ♂ ♂ 3 ♀ ♀; areas 5, 12, CB. *Asclepias erosa*, *Petradoria pumila*, *Stanleya pinnata* (most common host); June, Aug.
- Andrena* sp.: ♂; area CE; host unknown; March.
- Anthidium dammersi*: ♂ ♀; areas 1, 18; *Erigeron pumilus*; May; June.
- Anthophora californica*: ♂ ♀; area 5; *Stanleya pinnata*; June.
- A. porterae*: ♂; area 4; host unknown; March.
- A. urbana*: 8 ♂ ♂ 24 ♀ ♀; areas 5, 12, 17, 18, CB, TM; *Asclepias erosa*, *Astragalus lentiginosus*, *Gayophytum ramosissima*, *Malacothrix glabrata*, *Oenothera californica*, *Petradoria pumila*, *Stanleya pinnata*; most common host was *S. pinnata*, with *A. erosa* and *P. pumila* also frequently represented; most were taken in June, about half as many in July, and few in August.
- Anthophora* new species: 5 ♂ ♂ 1 ♀; area CE; host unknown; March.
- Ashmeadiella aridula*: ♀; area 2; *Pectis papposa*; Aug.
- A. australis*: ♀ ♀ 2?; area 12. *Penstemon palmeri*; July.
- A. bigeloviae*: ♀; area 10; *Salsola kali*; Sept.
- A. inyoensis*: 4 ♂ ♂; area 5; host unknown; May.
- A. opuntiae*: 2 ♂ ♂ 3 ♀ ♀; areas 12, 13, CB; *Echinocereus engelmannii* (most common host), *Opuntia erinacea*; May, July.
- Bombus morrisoni*: 7 ♀ ♀; areas 5, 12; *Petradoria pumila* (most common host), *Stanleya pinnata*, *Viguiera multiflora*; July, Aug.

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- Centris rhodopus*: 19 ♂♂ 6 ♀♀; areas 5, 6, CB, 401. *Cleome lutea*, *Eriogonum inflatum*, *Stanleya pinnata* (most common host), *Tamarix pentandra*; June-Sept., mostly July.
- Ceratina nanula*: ♀; area 17; *Malacothrix glabrata*; June.
- Chelostomoides lobatifrons*: ♂; area CB; *Asclepias erosa*; June.
- Dialictus albhirtus*: 33 ♂♂ 3 ♀♀; areas 5, 6, 12, CB, EM, T; *Artemisia tridentata*, *Asclepias erosa* (most common host), *Chrysothamnus paniculatus*, *Eriogonum inflatum*, *Eriogonum fasciculatum*, *Larrea divaricata*, *Petradoria pumila*, *Salix goodingii*, *Stanleya pinnata*, *Tamarix pentandra*; June (mostly), July.
- D. hyalinus*: ♂ 11 ♀♀; areas 1, 5, 6, 12, 17, CB, EC; *Acamptopappus shockleyi*, *Asclepias erosa*, *Calochortus flexuosus*, *Malacothrix glabrata*, *Penstemon palmeri*, *Stanleya pinnata*, *Viguiera multiflora*; May-Aug.
- D. incompletus*: 12 ♀♀; areas 12, FM; *Bromus rubens*, *Calochortus flexuosus*, *Penstemon bridgesii*, *Penstemon floridus*, *Penstemon palmeri* (most common host); July.
- D. microlepoides*: 11 ♂♂ 7 ♀♀; areas 12, CB, EM; *Artemisia tridentata*, *Asclepias erosa* (most common host), *Eriogonum fasciculatum*, *Penstemon bridgesii*, *Tamarix pentandra*, *Viguiera multiflora*; June (mostly), July.
- D. nevadensis*: 2 ♀♀ area 12; *Penstemon palmeri*; July.
- D. pruinosum*: ♂; area CB; *Asclepias erosa*; June.
- Dialictus* sp. 1, ? new: 2 ♀♀; area 12; *Castilleja linariaefolia*, *Chrysothamnus* sp.; July, Aug.
- Dialictus* sp. 2, ? new: ♂; area CB; *Asclepias erosa*; June.
- Dialictus* sp. 3, ? new: ♀; area 410; *Eriogonum fasciculatum*; July.
- Colletes eulophi*: ♂ ♀; areas 5, 17; *Sphaeralcea* sp., *Stanleya pinnata*; June.
- Colletes* sp., ? new: ♀; area 17; *Sphaeralcea* sp.; June.
- Diadasia australis*: 2 ♂♂; areas 12, 17; *Opuntia erinacea*; June, July.
- D. diminuta*: 4 ♂♂ 3 ♀♀; areas 5, 17; *Sphaeralcea ambigua* (most common host), *Stanleya pinnata*; June.
- D. lutzi*: ♂ ♀ 1?; areas 5, 17; *Sphaeralcea* sp., *Stanleya pinnata*; June.
- Dianthidium pudicum*: ♂ ♀; areas 16, 19; *Chrysothamnus viscidiflorus*; June, Aug.
- D. subparvum*: ♂ ♀; area 12; *Chrysothamnus viscidiflorus*, *Petradoria pumila*; July, Aug.
- D. ulkei*: 2 ♂♂; areas 12, FC; *Artemisia tridentata*; July.
- Dioxys productus*: ♂; area 5; host unknown; March.
- Dufourea* new species 1: ♀; area JA; host unknown; April.
- Dufourea* new species 2: ♀♀; area 12; *Phacelia peirsoniana*; June.
- Epeolus minimus*: ♀; area 5; host unknown; May.
- Evyllaenus ruficornis*: ♀; area 19; host unknown; June.
- Halictus hyalinus*: ♀; area 401; *Chrysothamnus parryi*; Aug.
- H. tripartitus*: 7 ♀♀; areas 12, CB, FM; *Calochortus flexuosus*, *Eriogonum fasciculatum*, *Lupinus palmeri*, *Penstemon* sp., *Petradoria pumila*, *Viguiera multiflora*; June, mostly July, Aug.

- Heriades timberlakei*: 5 ♂♂ 4 ♀♀; areas 12, 13; *Opuntia erinacea*,
Viguiera multiflora; July.
- Hesperapis wilmattae*: ♀; area 401; *Malacothrix glabrata*; June.
- Hylaeus asininus*: 2 ♂♂; area 12; *Chrysothamnus viscidiflorus*;
Aug.
- Hypomacrotera subalpinus*: 4 ♂♂; area 5; *Baileya multiradiata*,
Sphaeralcea ambigua, *Stanleya pinnata*; June.
- Lasioglossum sisymbrium*: 3 ♀♀ 5?; areas 5, 12, 18, 19; *Chryso-*
thamnus viscidiflorus, *Eriogonum pumilus*, *Hymenoxys cooperi*,
Penstemon sp., *Stanleya pinnata*, *Viguiera multiflora*; June-Aug.
- Lithurgus apicalis*: 3 ♂♂ 1 ♀; areas 12, 13; *Opuntia erinacea*; July.
- Melectomorpha californica*: 2 ♂♂ 2 ♀♀; areas 5, CB; *Asclepias*
erosa, *Stanleya pinnata*; June, July.
- Melissodes subagilis*: 7 ♀♀; areas 5, 12, 17; *Baileya multiradiata*,
Chrysothamnus viscidiflorus, *Petradoria pumila*, *Sphaeralcea*
ambigua, *Stanleya pinnata*; June-Aug.
- M. tristis*: ♀; area 12; *Petradoria pumila*; July.
- Micranthophora hololeuca*: 2 ♂♂ 2 ♀♀; area TA; *Sphaeralcea*
munroana; June.
- M. phenax*: ♂; area 1; host unknown; April.
- Nomia tetrazonata*: ♂; area CE; *Berula erecta*; July.
- Osmia titusi*: ♂; area 5; host unknown; March.
- Osmia* sp., ? new: ♂ ♀; areas 5, 17; *Astragalus lentiginosus*, *Descu-*
rainia pinnata; May, June.
- Perdita arcuata*: ♂ 2 ♀♀; area 5; *Sphaeralcea ambigua*; June.
- P. callicerata*: ♂; area 12; *Chrysothamnus paniculatus*; June.
- P. chloris*: ♀; area 16; *Eriogonum deflexum*; Aug.
- P. fallugia*: 5 ♂♂; areas 12, 18; *Cowania* sp. (most common host),
Eriogonum pumilus, *Oenothera californica*; June.
- P. nasuta*: 2 ♀♀ 7?; area 6; *Eriogonum inflatum*; July.
- P. thermophila*: ♂ ♀; areas 6, 410; *Eriogonum inflatum*; July.
- Perdita* new species: 8 ♀♀; areas 16, 401; *Dalea polyadenia*, *Erio-*
gonum deflexum (most common host); Aug.
- Sphecodes eustictus*: ♀; area 12; *Eriogonum deflexum*; Aug.
- Stelis* new species: ♀; area 10; host unknown; April.
- Tetralonia quadricincta*: ♂; area 4; host unknown; March.
- Tetralonia* new species "al": ♂ 2 ♀♀; areas 4, 5; *Stanleya pinnata*;
March, June.
- Tetralonia* new species "an": ♂; area 4; host unknown; March.
- Tetralonia* new species "mo": ♀; area 4; host unknown; March.
- Tetralonia* new species "pr": 4 ♂♂ 32?; areas 4, 5; host unknown;
March.
- Triepeolus helianthi*: ♂; area 5; *Sphaeralcea ambigua*; June.
- Xylocopa californica*: ♀ 7?; areas 5, M; *Stanleya pinnata*; June
(mostly), July.

PLANT-BEE ASSOCIATIONS

Acamptopappus shockleyi
Dialictus hyalinus
Artemisia tridentata

Dialictus albohirtus
D. microlepoides
Dianthridium ulkei

- Asclepias erosa*
Agapostemon texana
Anthophora urbana
Chelostomoides lobatifrons
Dialictus albohirtus
D. hyalinus
D. microlepidoides
D. pruinosum
Dialictus sp. 2
Melectomorpha californica
Astragalus lentiginosus
Anthophora urbana
Osmia sp.
Baileya multiradiata
Hypomacraera subalpinus
Melissodes subagilis
Berula erecta
Nomia tetrazonata
Bromus rubens
Dialictus incompletus
Calochortus flexuosus
Dialictus hyalinus
D. incompletus
Halictus tripartitus
Castilleja linariaefolia
Dialictus sp. 1
Chrysothamnus paniculatus
Dialictus albohirtus
Perdita callicerata
Chrysothamnus parryi
Halictus hyalinus
Chrysothamnus viscidiflorus
Dianthidium pudicum
D. subparvum
Hylaeus asininus
Lasioglossum sisymbrium
Melissodes subagilis
Chrysothamnus sp.
Dialictus sp. 1
Cleome lutea
Centris rhodopus
Cowania sp.
Perdita fallugia
Dalea polyadenia
Perdita sp.
Descurainia pinnata
Osmia sp.
Echinocereus engelmanni
Ashmeadiella opuntiae
Erigeron pumilus
Anthidium dammersi
Lasioglossum sisymbrium
Perdita fallugia
Eriogonum deflexum
Perdita chloris
Perdita sp.
Sphecodes eustictus
Eriogonum fasciculatum
Dialictus albohirtus
D. microlepidoides
Dialictus sp. 3
Halictus tripartitus
Eriogonum inflatum
Centris rhodopus
Dialictus albohirtus
Perdita nasuta
P. thermophila
Gayophytum ramosissima
Anthophora urbana
Hymenoxys cooperi
Lasioglossum sisymbrium
Larrea divaricata
Dialictus albohirtus
Lupinus palmeri
Halictus tripartitus
Malacothrix glabrata
Agapostemon cockerelli
Anthophora urbana
Ceratina nanula
Dialictus hyalinus
Hesperapis wilnattae
Oenothera californica
Anthophora urbana
Perdita fallugia
Opuntia erinacea
Ashmeadiella opuntiae
Diadasia australis
Heriades timberlakei
Lithurgus apicalis
Pectis papposa
Ashmeadiella aridula
Penstemon bridgesii
Dialictus incompletus
D. microlepidoides
Penstemon floridus
Dialictus incompletus
Penstemon palmeri
Ashmeadiella australis
Dialictus hyalinus
D. incompletus
D. nevadensis
Penstemon sp.
Halictus tripartitus
Lasioglossum sisymbrium
Petradoria pumila
Agapostemon texana
Anthophora urbana
Bombus morrisoni
Dialictus albohirtus
Dianthidium subparvum
Halictus tripartitus
Melissodes subagilis
M. tristis
Phacelia peirsoniana
Dufourea sp. 2
Salix gooddingii
Dialictus albohirtus
Salsola kali
Ashmeadiella bigeloviae
Sphaeralea ambigua
Diadasia diminuta
Hypomacraera subalpinus
Melissodes subagilis
Perdita arcuata

Triepeolus helianthi
Sphaeralcea munroana
Micranthophora hololeuca
Sphaeralcea sp.
Colletes eulophi
Colletes sp.
Diadasia lutzii
Stanleya pinnata
Agapostemon texana
Anthophora californica
A. urbana
Bombus morrisoni
Centris rhodopus
Dialictus albohirtus
C. hyalinus
Colletes eulophi
Diadasia diminuta
D. lutzii

Hypomacrotera subalpinus
Lasioglossum sisymbrium
Melectanorpha californica
Melissodes subagilis
Tetralonia sp.
Xylocopa californica
Tamarix pentandra
Centris rhodopus
Dialictus albohirtus
D. microlepoides
Viguiera multiflora
Bombus morrisoni
Dialictus hyalinus
D. microlepoides
Halictus tripartitus
Heriades timberlakei
Lasioglossum sisymbrium

SUMMARY

Between 1959 and 1965, bees representing 71 species of 35 genera were collected from plants of more than 40 species at the Nevada Test Site. Bees of nine of the species are new to science, and six others possibly are new. Most specimens were taken during June and July, but some were found as early as March and others as late as September. Bees of greatest abundance, as indicated by those collected, were *Dialictus albohirtus*, *Tetralonia* n. sp. "pr," *Anthophora urbana*, and *Centris rhodopus*. Those with the widest geographic distribution at the test site were *Dialictus hyalinus*, *D. albohirtus*, and *Anthophora urbana*. The species found on the greatest variety of plants was *Dialictus albohirtus*. A greater variety of bees was found on *Stanleya pinnata*, *Asclepias erosa*, and *Petradoria pumila* than on other plants.

REFERENCES

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